

requests that Examiner withdraw the objection to the Abstract of the Disclosure.

#### Objections to the Claims

Claim 42 stands objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to limit the subject matter of a previous claim (Office Action mailed 26 September 2002; item 3, 4). It has been amended to properly depend on claim 34. Claim 67 stands objected to for the following informality: replace "inductors" with "-inductor-"; amendment has been made. Applicant respectfully requests that Examiner withdraw the objection to the claims under 37 CFR 1.75(c).

#### Objection to the Drawings

The drawings stand objected to under 37 CFR 1.83(a) as not showing every feature of the invention specified in the claims (Office Action mailed 26 September 2002; item 3).

The drawings stand objected to as not showing "S+1 inverter terminals distant from the first inverter terminal" and "the first and second inverter terminals" recited in claims 34 and 83. The term "S+1 inverter terminals distant from the first inverter terminal" has been amended to "a first inverter terminal, and a second inverter terminal S skipped terminals distant from said first inverter terminal", which is clearly shown in new Fig. 2b; here each terminal 4 of motor windings 1 are clearly shown to be connected to a single inverter terminal 2 and the two winding terminals of each winding are individually connected to different inverter terminals: a first inverter terminal and a second inverter terminal S skipped terminals distant from said first inverter terminal in order of electrical phase angle, where S is the skip number and represents the number of terminals skipped. In Fig. 2 the number of skipped terminals is zero (S=0), and so each motor winding is connected to adjacent terminals on the inverter. The term "the first and second inverter terminals" can be clearly understood from Figure 2b.

The drawings stand objected to as not showing "a receptor" recited in claim 59. Claim 59 has been cancelled from the claims.

The drawings stand objected to as not showing "windings comprising a single inductor" recited in claim 67. Claim 67 has been amended to "motor phases

comprise a single inductor"; such single inductors 1 are shown in Fig. 2a and 2b.

The drawings stand objected to as not showing "harmonic frequency components" recited in claims 43, 45, 91-97 and 101-107. A harmonic frequency component, that is, a component that has a frequency that is a multiple of the fundamental frequency, is well known. For the sake of simplicity and clarity, this feature has not been disclosed in the drawings.

Applicant respectfully requests that Examiner withdraw the objection to the drawings under 37 CFR 1.83(a).

#### Claims Rejections

Claims 34, 40-45, 47-59, 62, 64-67, 83, 84, 88 and 89 stand rejected under 35 USC 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time of the application was filed, had possession of the claimed invention (Office Action mailed 26 September 2002; item 7).

Examiner has objected to the specification and drawings for not clearly showing the "motor phase connected to first and second inverter terminals S+1 inverter terminals distant from the first inverter terminal". Applicant respectful draws Examiner's attention to the wording of claim 34, which states: "motor phase is electrically connected to a first inverter terminal and a second inverter terminal S + 1 inverter terminals distant from the first inverter terminal".

Thus it is to be understood that Applicant's invention comprises a mesh connection. Mesh connected three phase machines are well known in the art. The present invention is a different sort of mesh connection, but an individual skilled in the art would be familiar with the general concept of a mesh connection. The present invention comprises a mesh connection in which each of the N motor phases is connected to two inverter terminals: a first inverter terminal, and a second inverter terminal. The first inverter terminal is S skipped inverter terminals distant in order of electrical phase angle from the second inverter terminal.

Applicant has amended claims 34 and 83, the specification and the drawings so

as to reasonably convey to one skilled in the relevant art that Applicant had possession of the claimed invention at the time the invention was made.

Thus Fig. 2a now shows motor phase windings 1 and an inverter 5; phase angles for the inverter terminals 2 are shown. Motor phase terminals 4 are connected to inverter terminals 2. Motor phase terminals 4a are connected to a neutral point in a star configuration.

Fig. 2b shows mesh connected motor phase windings 1 and an inverter 5; phase angles for the inverter terminals 2 are shown. In this diagram, the motor winding is represented by a straight line.

Figs. 2c-e show mesh connected motor phase windings 1. For the sake of simplicity, motor phase terminals 4 and 4a, inverter terminals 2 and connecting wires 3 have been concatenated into inverter terminals 2, and the phase angles are now shown alongside the inverter terminals 2. The same simplification has been made for Figs. 3a-d.

The specification has been amended to take account of these changes to the Figures, and to more reasonably convey to one skilled in the relevant art that Applicant had possession of the claimed invention at the time the invention was made.

Applicant requests that Examiner withdraw the rejection of claims 34, 40-45, 47-59, 62, 64-67, 83, 84, 88 and 89 under 35 USC 112, first paragraph.

Claims 34, 40-45, 47-59, 62, 64-67, 83, 84, 88 and 89 stand rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly to point out and distinctly claim the subject matter which applicant regards as the invention (Office Action mailed 26 September 2002; item 9).

Applicant's comments above address this.

Claim 67 has been amended from "inductors" to "inductor" and from "said windings" to "said motor phases".

Examiner objects to claim 50 where  $N=4$ ; Applicant has made claim 50 dependent on claim 49 and claim 49 states, "wherein  $N$  is odd".

Claim 84 have been amended to include the limitation that  $N$  is odd. Claims 84 and 89 have been amended to define  $N$ .

Applicant requests that Examiner withdraw the rejection of claims 34, 40-45,

47-59, 62, 64-67, 83, 84, 88 and 89 under 35 USC 112, second paragraph.

**Claims Rejections - 35 USC 102(e) Isozaki et al**

Claims 34, 40, 43, 45, 48, 58, 62, 83, 88, and 91-97 are rejected under 35 U.S.C. 102(e) as being anticipated by Isozaki et al. Examiner states that with regard to claims 34 and 83, Isozaki et al. show a high phase order induction machine comprising an inverter system, and an induction motor having N phases, each motor phase is connected to a first and second inverter terminals  $S + 1$  inverter terminals ( $S=0$ , Figure 17) distant from the first inverter terminal, and the phase angle difference between the pair of inverter terminals is identical (Office Action mailed 26 September 2002; item 10). Applicant respectfully traverses.

The standard for determining novelty under 35 U.S.C. 102 was set forth by the court in *In re Bartlett*, 300 F.2d 942, 133 USPQ 204 (CCPA 1962). "The degree of difference [from the prior art] required to establish novelty occurs when the average observer takes the new design for a different, and not a modified, already-existing design."

In other words, for anticipation under 35 U.S.C. 102, the reference must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present.

In relation to claims 34 and 83, Examiner states in Paragraph 11 of the Office Action dated 09/26/2002 that Isozaki et al. show a high phase induction machine (5 phases, Figure 17) comprising an inverter system (Figure 17) and an induction motor (Figure 13) having N phases ( $N = 5$  phases).

However, Isozaki et al describe Figure 17 as a simplified diagram of a stator coil driving circuit for explaining the operation of the multi-phase PM-type stepping motor of the second embodiment, and they describe Figure 13 as is a vertically-sectioned side view of the multi-phase PM-type stepping motor of the second embodiment.

Thus Isozaki et al disclose a Permanent Magnet (PM) type stepper motor, whereas the present invention distinctly limits the scope of the invention to comprise an induction motor; thus claim 34 includes "an induction motor". A PM-type motor is distinctly different from the present invention, which comprises an induction motor. An induction motor is understood to be "an

alternating current electric motor in which the torque is produced by the interaction between the current in the secondary coil and the magnetic field produced by the primary coil" (The New Penguin Dictionary of Science, May 1998, ISBN 0-14-051271-3). In a permanent magnet motor, the secondary coil is replaced by one or more permanent magnets.

Thus Examiner has not shown how the reference (Isozaki et al) teaches every aspect of the claimed invention either explicitly or impliedly, nor shown how any feature not directly taught is inherently present. Examiner has not shown how Isozaki et al teaches the induction motor of claims 34, 40, 43, 45, 48, 58, 62, 83, 88, and 91-97.

Applicant requests that Examiner withdraw the objection to claims 34, 40, 43, 45, 48, 58, 62, 83, 88, and 91-97 under 35 USC 102(e) as being anticipated by Isozaki et al.

**Claims Rejections - 35 USC 103(a) Isozaki et al**

Claims 41, 42, 44, 47, 49-57, 59, 64-67, 84, 89, 90 and 98-107 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Isozaki et al. (Office Action mailed 26 September 2002; item 13). The Office Action states "it would have been obvious to one having ordinary skill in the art at the time the invention was made to select any skip number S, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art."

Applicant respectfully traverses, and for the reasons set out below, Applicant argues that there is no suggestion or motivation in Isozaki et al to modify the skip number S to anything but zero.

First there is no disclosure of any benefits in using an S=0 connection except with multi-stator PM type stepper motors in which phases are energized singly.

Secondly, there is no disclosure of other values of S.

Thirdly, it is not clear that modifying Isozaki et al's invention to increase the value of S would have a reasonable expectation of success, since each of the phases of Isozaki must be energized alone.

Fourthly, increasing the skip number S in any motor, indicates that each of the motor phases are driven with two inverter terminals which are not of the

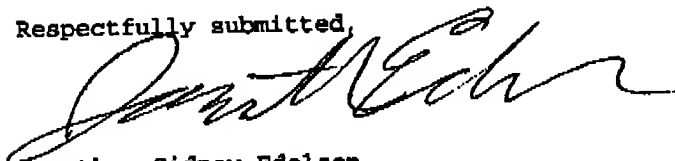
adjacent phase. This is an added complication which would require a stated motivation to be warranted.

Applicant respectfully submits that it is not obvious to one skilled in the art to modify or extend Isozaki et al's invention in the manner suggested by the Examiner. Applicant respectfully requests that Examiner withdraw the objection to the claims as being unpatentable over Isozaki et al. under 35 USC 103(a).

**CONCLUSION**

Applicant submits that this application, as amended, is in condition for allowance, and such disposition is earnestly solicited. No new material has been added to the application as amended. If the Examiner believes that discussing the application with Applicant might advance the prosecution, I would welcome the opportunity to do so.

Respectfully submitted,



Jonathan Sidney Edelson  
Inventor